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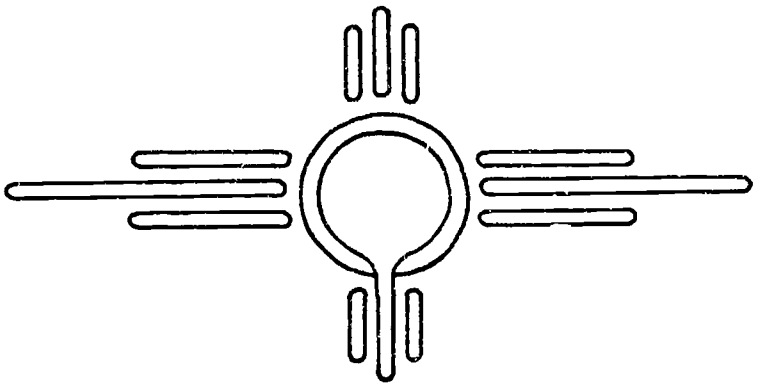
ABSTRACT

This paper examines different types of student learning styles and outlines a four-step process for identifying and integrating these learning styles to provide students with the most effective educational experience possible. The paper lists five dimensions along which most learning styles can be categorized--global-analytical, verbal-imaginal, concrete-abstract, trial/error/feedback-reflective, and modality. The paper then discusses steps for classroom integration of different learning styles: (1) identify the learning styles of individual learners; (2) match teaching styles to learning styles for difficult learning tasks; (3) strengthen weaker learning styles for easier learning tasks and in drill and practice; and (4) teach learning style selection strategies. Classroom examples of various learning styles are also presented. Three appendixes provide copies of a learning style identification scale, a teaching style identification scale, and a list of behavioral indicators of learning styles. (MDM)

LEARNING STYLES AND THE CLASSROOM



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INTRODUCTION

An Image of Learning Styles

In your mind I would like you to develop a crystal clear image of a group of students. They may be adults, or young children. They may be intermediate or high school students. Perhaps they are the students in the class you teach, or possibly a small group that you tutor. But whoever these students are, get that image as clear and as real in your mind as you possibly can.... As you imagine these students, look particularly at their faces. Make sure your image includes, vividly, the looks on their faces as they are learning....

Now imagine that you have a very difficult and important concept for these students to learn.... Use a specific concept that you have taught before, one that you know they would have to learn and might have difficulty with.... The learning task may be the basic concept of fractions.... It may be latitude and longitude.... It may be the quadratic equation.... It may be the concept of noun as a name of a person, place, or thing for primary students.... It may be the concept of democracy ... or the concept of love in poetry....

Whoever the student or whatever the concept, I hope you have them both quite clearly and concretely in your mind's eye....

Now imagine yourself beginning to teach this concept, this important but difficult concept.... Imagine yourself beginning.... In your mind's eye you may be standing in front of the students.... Or sitting on a chair, with the students on the floor around you.... Or perhaps the students using some hands-on materials.... But imagine yourself now beginning to introduce this difficult concept....

As you introduce the concept, as you explain it, look carefully at the faces.... What sort of faces do you see? What expressions do you see...? Certainly some of the faces will tell you "I understand", or "I am beginning to understand".... Imagine that look of curiosity combined with satisfaction that tells you the student is learning.... But there is another group of students.... Their faces tell you that they don't understand.... Their brows are furrowed, they may be looking frustrated, or impatient.... And finally there is at least one more group of

students.... The look on their faces say "I don't really care".... Hopefully there are not many of these faces, but we all know there will be some.

Now imagine that you have been working on the concept for a few minutes and you decide its time to make a shift.... You decide it's time to come at this new idea from a slightly different approach, a different tack.... You decide to explain it another way, or have the students work on it another way.... You're still trying to help the students learn the same concept but you're coming at it from a different angle.

Again look at the expressions on the faces.... Look for those three types of expressions again - the expressions that say "I understand", and "I am beginning to understand" or "I don't understand", and "I am getting frustrated", or "I don't really care", and "I give up".... Look at this image for a moment and then go on to the next paragraph.

This is a very important and yet very difficult topic.... So you decide, indeed you have probably planned, to come at it from a third approach.... And so you make another shift.. As before when you change your approach you find a few more faces indicating that the students is understanding, an increasing number of students are getting the idea.... Hopefully in your image the number of students that doesn't understand or don't care is gradually decreasing.

Now imagine that it is a short while later or perhaps the next day. Students are working on the concept individually or in small groups.... They are likely doing activities or drill while you are working one-on-one with the students who are still having difficulty.... Can you picture yourself crouched down beside a student explaining the concept and suddenly the "a-ha" look comes over the child's face, he understands, she gets the idea.... But we all remember going to the next student, trying exactly the same approach and the "a-ha" doesn't come.

Now since this is your imagination, and you have complete control over the images, treat yourself to the image of every single one of those faces with a look that says "I understand".... This doesn't happen very often in the real classroom, but it's a great way to end the image.

Now take a few minutes to review what you have just done. The learning task was the same for each student, but the learning processes they used best were different. And your teaching approaches to the task were quite different.

In the image, some students learned best from the first approach you used. The other approaches or tasks or activities simply reinforced. Other students learned best from the second or perhaps the third or perhaps the one-on-one; the other approaches helped or hindered. Check back to your image and you will probably find that some of the brightest students and some of the slowest students seem to learn best from the same approach.

I have used this image to illustrate how I use the term "learning styles". Learning styles reflects the individual differences, the different processes, especially the different cognitive processes that students use to learn - even though the learning task is the same for all the students. Learning styles is a way of looking at individual differences which focuses on the processes that students usually use or the processes that they use most effectively.

Definition

For some readers the image gave a fairly clear idea of the meaning of learning styles and how it applies to individual differences. Other readers aren't really comfortable until I provide a more precise definition. So here it is:

Learning styles are the mental processes and instructional settings a student uses most effectively while learning.

From the imagining you did, learning style referred to processes, especially internal cognitive mental processes. These processes may include receiving, coding, organizing, structuring, understanding, storing, and retrieving. Learning style may also refer to settings such as instructional settings which include learning with a teacher rather than another adult or a peer, cooperation or competition, group or individual, formal or informal, and teacher-student relationship. The setting may also refer to the physical setting such as time of day, desk arrangement, lighting, and temperature.

Learning styles may also refer to the usual, rather than the most effective processes and settings. But it is far more practical in the classroom to focus on the most effective learning styles.

Some Examples

Here are some specific examples of different types of learning styles.

I have just demonstrated one type of learning style. The image which I used in the first section encouraged you to use an "imaginal" process. When I moved to the definition, however, I did it in such a way as to encourage a verbal process. One way of looking at learning styles is to imagine a spectrum or continuum with the word "verbal" at one end and "imaginal" at the other:

Verbal.....Imaginal

You may have learned more effectively or preferred the imaginal process. You might have used the verbal process more effectively or preferred it. But more about this continuum later.

Another example comes from the approaches we use to teach beginning reading. Over the last decade we have increasingly used the "whole language" approach. This approach focuses on the "big picture", the meaningful context, the overall understanding before learning the details. For example a grade one teacher may take her class on a walk which includes having the children wipe their feet on the "mat" at the door to the school. When the children return to the classroom they develop a story which might include the word "mat" along with many other words all embedded in a meaningful, global, complete story. This uses a "global" learning style.

Contrast this with the phonics approach. In this second approach, the teacher may introduce the word "mat" by printing it on the chalkboard or on a card. The children sound out each letter separately - "m", "a", "t". Then gradually they would slide the sounds together to learn the word "mat". The phonics approach is

an example of an "analytic" process which is really very different from the global process used in whole language. Of course whole language and phonics involve far more than I have just presented. I have only extracted those components which are useful to my example.

If you have taught beginning reading you already know that some students profit much more from a global approach. Others profit more using an analytic approach. This example illustrates a learning style continuum with "global" at one end and "analytic" on the other.

Global.....Analytic

Other examples include learning from peers rather than the teacher, learning in a competitive environment rather than a cooperative one, learning in bright light rather than a dull light, or learning in a warm rather than a cold room.

In all of these examples the common elements are that the students are learning the same thing but using different processes to do so.

TYPES OF LEARNING STYLES

There are many different types of learning styles. The examples above have really focused only on two. As part of my research I have gathered information on the many ways in which educators and researchers have looked at learning styles. My latest count is about 65 types of learning styles. I don't intend to go through all of these because there is considerable overlap among them and some really have no practical value for classroom settings. I have listed below those types of learning styles which I find most meaningful to us as teachers. At this point they are simply listed. They are defined and discussed in more detail in a later section.

Cognitive Processes

1. Global....Analytic
2. Verbal....Imaginal
3. Concrete....Abstract
4. Trial-Error-Feedback....Reflective
5. Modality (Seeing, Hearing, Touching, Smelling, Tasting)

Instructional Setting

1. Cooperative....Competitive
2. Individual....Group
3. Adult....Peer
4. Formal....Informal
5. Type of Humor
6. Warm....Cold Teacher
7. High....Low Demand Climate
8. Active....Receptive

Physical Setting

1. Desk Arrangement
2. Temperature
3. Light Level
4. Time of Day

Cognitive Processes Explained

The learning styles in which I am most interested are the cognitive or mental processes. In my experience as a classroom teacher, in working with other teachers, and in my research, I find that the cognitive processes are the most important for improving learning effectiveness and teaching effectiveness. So I will look at some of these processes in more detail. In particular, I will define and describe them in terms of the behavior that they elicit in a learning situation.

1. Global -- Analytic

The first dimension is Global --- Analytic. At the *global* end, the student tends to understand best when the overall concept is presented first, or presented in a meaningful context. The more *analytic* student tends to learn best when learning is presented in small pieces and gradually built up to the whole; context is less important (even confusing).

For example, in learning latitude and longitude, the more global student will learn best when the functions of both longitude and latitude are presented with meaningful examples right at the beginning. An overall chart may be particularly helpful for this student. The more analytic student will learn best if one term is presented first and fully understood, then the second term, then the examples and functions.

Note: It is important to think of global and analytic processes as being on a spectrum or continuum representing different combinations of global and analytic processing. Some learning style models strictly categorize students into either global or analytic, rather than more global or more analytic. They miss the fact that no learning or thinking process is entirely global or entirely analytic. I prefer to conceptualize students as being at different places on a continuum between exclusively global and exclusively analytic processing.

2. Verbal -- Imaginal

The second dimension of learning styles is Verbal --- Imaginal. The more *verbal* learner learns better from highly verbal explanations or from dictionary-style definitions, relies more on words and labels uses, verbal regulation of behavior more effectively, and codes concepts verbally. The more *imaginal* learner learns better from images, symbols and diagrams. The more imaginal learner remembers better if the coding uses images, and uses images to regulate behaviour.

Imagery may be one of areas in which our western, European culture is lacking. We don't seem to make good use of it except in poetry and advertising. Yet imagery can be very effective in teaching. Almost all of us could improve our teaching techniques in this area.

Note: Imagery refers to more than visual imagery. An image may be related to any of the senses. For example, learners can process sound images or images involving any of the other senses. One student may have a sound-image of a major chord by remembering the individual notes which make up that major chord (an analytic image) or by remembering the sound-image which those sounds make when they occur together (a global image).

Images need not be memories of actual events nor do they need to be correct. For example, imagine the taste of a mustard and jam sandwich. While it's not likely that you've ever had such abominable combination, I'm sure you can imagine its taste, correctly or incorrectly.

Images need not be concrete. They can be quite abstract. For example, consider your images for the word "love", or "power". These words bring a very complex set of concrete (visual, tactile, aural) and abstract images to mind. The abstract images may be so abstract and complex that they couldn't possibly be

communicated. But they exist, and they are very much a part of remembering and learning processes.

3. Concrete -- Abstract

The third dimension for learning styles is Concrete --- Abstract. This dimension needs little explanation, except to remind the reader that some students do learn better when the concept is presented first in its abstract form (perhaps as a principle or rule). Such students will sometimes even be confused by, or fixate on, the concrete examples which you give.

4. TEF -- Reflective

The fourth dimension, TEF --- Reflective, is still being developed. It comes mainly from my cross cultural work. At one end of the continuum is a Reflective type of learning in which the learner completely thinks through the new learning before using it. At the other end is what I call *Trial/Error/Feedback* or *TEF*, in which the learner responds more quickly (Trial), knowing the answer may not be completely correct (Error), expecting to learn from the teacher's Feedback to the response.

We use both types of learning as part of teaching. For example, we may ask the student to carefully think through a concept before answering (reflective). Or we may use a TEF approach by asking the child to respond (trial), knowing that there will be some errors in the response and that we will give some feedback to help the student refine his or her understanding.

Impulsive responding is not the same as TEF. Impulsiveness is usually ineffective for learning because it involves trial and error but no feedback. If the TEF approach is to work well, feedback which is perceived and understood must be an integral part of the process.

5. Modality

The fifth dimension of learning styles is Modality. This multiple dimension reflects the fact that some students learn more effectively through seeing, others through hearing, others through touching, and so on. For example, a kindergarten student learning the letters of the alphabet may be helped considerably by tracing letters on a piece of sandpaper cut in the shape of the letter (tactile mode). Another student may find this of little value. One student may find visual input (visual mode) more useful than auditory in learning; another may find the opposite.

CHARACTERISTICS OF LEARNING STYLES

Learning Styles are Continuums, Spectrums

A great deal of the research on learning styles assumes the child is either global or analytic, verbal or imaginal, concrete or abstract. This has resulted in limiting much of the potential for learning styles, and even destroying any positive impact it may have. It is far more useful to consider learning styles as continuums or spectrums. As a teacher you would not look at a particular student as being either global or analytic. Rather, every learner usually uses a combination of global and analytic processes. But he or she uses more effectively or more often than the other. Indeed, in teaching, we will often use both global and analytic processes so that one will reinforce the other; similarly we often use both verbal and imaginal processes so that one will reinforce the other.

You are working with a student who is very strong on global processing, it doesn't mean that he or she will be incapable or unwilling to use analytic processing. This is very helpful to know especially when we are working with special needs students. We as teachers don't need to look at our task as developing a whole new learning style for the student. Rather we need to improve and develop one that already exists.

This notion of continuums applies to many of the learning styles listed above. But note, from the list on page 5, that it does not apply to all.

Are Learning Styles Learned?

I am often asked if learning styles are learned or innate. The weight of evidence suggests that learning styles are learned. As we learn more about prenatal and neonatal development we may find that there may be some innate predisposition for some individuals, but not for gender or race.

How are learning styles learned? The quick answer is "In many ways". Let me give a more detailed answer through an example. When my son was 4, he asked me what makes a rainbow. Having been a physics teacher at one time, I began to explain reflection and refraction, light waves and color. Even though I tried to use words that were at his level he soon gave up. "It's ok, Daddy I understand now". Of course he didn't understand at all and he had learned almost nothing about rainbows. However he had learned something. He had learned that when there is a very difficult concept to be understood, a lot of words will be used. The seeds were being sown for a verbal learning style.

In this way most of our learning styles are learned as young children from mother, father, grandparents, and close family friends with whom we interact regularly. From them we learn content about the world around us, but we also "learn how to learn" - learning styles. Their learning styles will have a considerable influence on our learning styles. By the time the child gets to our classroom many of the learning styles have already been laid down.

It is important to add that learning styles can change; new learning styles can be learned. In fact this often happens in the first few years of school if the learning

styles encouraged by the teacher are different from the learning styles encouraged by the parents. In one study some years ago we looked at a group of Native Indian children who came daily from a relatively isolated traditional village, some thirty miles from the school in town. At the beginning of grade 1 the children were tested for learning styles strengths and preferences. They had pronounced global learning style strength, and preference. They were relatively weak and seldom used analytic processing. Of course there were significant individual differences between the children, don't take this example as a stereotype of all Native Indian children. At the beginning of grade 3 the children were retested. We found that they had a relative strength in global processing. However, they used analytic processes almost exclusively, even when it was quite inappropriate to do so. What had happened over the intervening two years? As you might expect the teaching styles in grades 1 and 2 had been highly analytic. Global processes were seldom used and were given little credibility. These students had "learned" a new learning style. They learned that at school, one must always use an analytic sequential learning style. And this change in learning styles was unconscious, which leads to the next section.

Learning Styles Are Usually Learned and Used Unconsciously

It appears from experience in the classroom, interviews with learners, and my research, that learning styles are usually learned unconsciously. Children do not realize that they are learning "learning styles". Older students and adults may be consciously aware of their learning styles and of the fact that they are making decisions on which learning styles to use. But even with adults, the learning of learning styles and decision making related to learning styles are still largely unconscious.

For example, as you read this resource book you are using various learning styles to learn the concepts. As you read this material, how many times have you consciously made a learning style decision? How many times have you consciously decided to process, organize and code the information more globally or analytically, more verbally or imaginably? I suspect that the number of times you have made these decisions consciously is very small. But you have probably made hundreds of such decisions unconsciously.

Learning Style Profiles

It is possible to describe the learning styles of an individual student by use of a profile of relative strengths and weaknesses across the various types of learning styles we have been discussing. If you have time as a teacher it would be very helpful to have a profile description for each of your students. However, that's not usually possible because of time limitations. But there are ways you can use the profile idea - to be discussed later in the Implementations section.

It is important to recognize that each individual learner has a unique pattern of strengths and weaknesses across learning styles - a pattern we can build on when we come to new and difficult learning tasks, and a pattern that we can develop so the student improves his or her weaker learning styles.

The "Best" Learning Style

For a given learning task, what is the best learning style? The answer is two-fold. The "best" learning style is determined by two factors:

1. The learning style strengths of the learner
2. The nature of the learning task

So far we have been concentrating on the learner. But it is also necessary to look at the learning task, and determine its impact on the decision as to which learning style is most appropriate.

Let's look at some examples. If we want students to learn to do long division, say 4625.91 divided by 91.9, the student is almost forced to use an analytic process, unless there is a calculator handy. There are some global aspects to this problem such as application and understanding that division is a form of grouping. But when it gets down to doing the actual calculation the "best" learning style (actually processing style in this case) is analytic. The learner has no choice.

Another example comes from a Language Arts or English class in which the teacher asks the students to determine the theme of a short story. In this case the most effective process is global rather than analytic. A student could determine the theme of a short story by using an analytic process, but it would be very time consuming and confusing. Certainly the student who has a skill at understanding the overview and getting "the big picture" of the short story would be at a real advantage. Here is another case in which the nature of the task determines the "best" learning style.

Another example is learning to ride a bicycle. At some point the learner must get on the bicycle and learn, through a series of trials, errors, and psychomotor feedback by falling off the bicycle, and learning how to keep balanced. The novice bicycle rider quickly learns that if the bike starts to fall towards the left the front wheel should be turned towards the left. The first few times the learner tries it he or she will probably over-correct and fall in the opposite direction. Incidentally this example reminds the reader that so much of learning styles is unconscious. How many individuals who are quite capable of riding a bicycle realize that turning the wheel in the direction that they are falling is the basic way to keep balanced on a bicycle?

So it is not just important to know the stronger learning styles of the students but we must recognize that a specific learning task may demand a particular learning style, even if it is a weaker style. This has some very important implications for our discussion on implementation of these ideas to the classroom.

Teaching Styles

So far we have concentrated on learning styles with only passing reference made to teaching styles. Now is the appropriate point to focus on teaching styles.

I regard <u>teaching style</u> as providing a teaching situation in which a particular <u>learning style</u> is emphasized. At the beginning of this article I used an image as a way of putting across the notion of learning style. My teaching style at that point

was imaginal because it emphasized an imaginal learning style. Teaching style is the mirror image, the complement of learning style.

The relationship between teaching style and learning style is analogous to the relationship between learning and teaching. Learning is the acquisition of knowledge, understanding, skills, and attitudes by individuals. Teaching is the provision of a situation in which learning may occur. The diagram on the next page presents these definitions in a diagram (imaginal).

The Teaching Style Identification Scale and the Learning Style Identification Scale in the Appendix further illustrate the relationship.

DEFINITIONS RELATING LEARNING STYLES AND TEACHING STYLES	
LEARNING: The acquisition of knowledge, skills and understanding	LEARNING STYLE: The usual, or stronger, processes an individual uses in learning
TEACHING: Providing a situation in which learning may occur	TEACHING STYLE: Providing a teaching situation in which a particular learning style is emphasized

STEPS FOR CLASSROOM USE

Introduction

I have developed a four step process for using learning styles in the classroom. First an overview (global) of the steps is presented. This is followed by a more detailed (analytic) discussion of each step.

1. **IDENTIFY** learning styles of individual learners.
2. **MATCH** teaching styles to learning styles for difficult learning tasks
3. **STRENGTHEN** weaker learning styles for easier learning tasks and in drill and practice
4. Teach learning styles **SELECTION STRATEGIES**

1. IDENTIFY learning styles of individual learners.

It is very important that you as the teacher identify the individual learning styles of each of your students. Don't just categorize their learning styles on the basis of the cultural groups to which they belong.

To help with identification, I have developed an integrated pair of Learning Style and Teaching Style Scales. Copies of the Scales are included in the Appendix.

The first scale, the *Learning Style Identification scale,* is completed by the teacher after observing and working with the child in the classroom setting for a few weeks. The Scale is based on classroom behaviors which teachers can readily observe. It was developed with input from teachers in many parts of Canada and the U.S. It takes about 10 minutes per student for you to complete the scale, so use it with those students with whom you are having the most difficulty.

The second scale is the *Teaching Style Identification scale.* It is also completed by the teacher and is based on behaviors the teacher may use when teaching difficult concepts or tasks. The behaviors on the Teacher Scale are closely related to the behaviors on the Learning scale. This allows the teacher to compare his or her teaching styles to the learning styles of the student(s).

Another approach to identification is to familiarize yourself with behavioural indicators of the various learning styles (see Appendix). Then watch for the behaviours over about four weeks. Try to stage situations in which they might occur. Set aside about one minute per teaching hour to systematically record learning style strengths and weaknesses. Use "post-it" notes or make it part of your anecdotal record-keeping for report cards. Then summarize your results at the end of four weeks. You will not only have useful information on many of your students; but you will also find you are already making adjustments in your teaching style.

2. MATCH teaching styles to learning styles for difficult learning tasks.

This step seems straightforward but it presents two major problems. The first problem is to develop the variety of teaching styles required to match the

learning styles of your students. Good teachers already have a variety of teaching styles, so it is not as great a problem it may seem. In fact, working on your weaker teaching styles is an obvious way to improve your teaching effectiveness.

The second problem is to deal with the multitude of learning style strengths in a classroom, whether it is an all-Indian class, or a mixed class. The general guideline , with a difficult learning task, is to teach to the most frequent learning style strengths in your class. The more important the learning task, the greater the variety of learning styles to teach to. When you use a particular teaching style, it is of greatest help to students with the matching learning style. Keep in mind that this particular learning style also can "lay the groundwork" or reinforce for students who do not have the matching learning style strength.

But there is more to effective application than simply matching learning styles and teaching styles. Focus on steps 2 and 3 together.

3. STRENGTHEN weaker learning styles for easier learning tasks and in drill and practice.

Since some tasks require a specific learning style, students must be able to work with a variety of learning styles. A Native Indian student may have to develop greater proficiency in Western European learning styles since that is how the texts and curricula are organized and presented. But don't overdo this. Respect the student's stronger learning styles as much as possible.

Improvement of weaker learning styles can be accomplished through practice-with-success. For example, present easier learning tasks in the weaker style. Use drill and practice which emphasize weaker learning styles, once the concept is learned.

4. Teach learning styles SELECTION STRATEGIES.

In most cases, learning style selection strategies develop unconsciously through emphasis on steps 2 and 3. In fact, for younger students or for students who are having academic difficulty, you will just confuse them if they have to learn selection strategies. Don't use check lists or new terms. Let it happen unconsciously through practice-with-success.

With other students, use "think aloud" or other means of consciously considering selection strategies. Some students are fascinated by the fact that they can learn a concept or mentally organize it in different ways. (But don't bog them down with learning styles jargon. Use their vocabulary.)

One significant advantage of raising selection strategies into conscious awareness is that it can be empowering for many of the students. We have found, particularly with students from cultural minorities, that they often unconsciously feel that their approach is wrong. To raise their learning styles into their awareness and then give them "permission" to use them, to indicate that they are as effective as any other process (if they are) is to give the minority student a new sense of the power or control over his or her own cognitive processes, self confidence and self esteem.

CLASSROOM EXAMPLES

The following examples were developed with teachers who used them in their classrooms. Note that the examples are related to learning styles more than to cultures.

1. Global

a) Many students with a global strength do well at filling in missing pieces in an overall structure. They also learn vocabulary better in a meaningful context. Use a cloze procedure (filling in missing words) with a story to develop vocabulary. Select a story or section from a text, delete the words you want learned. Also delete a few words that the student already knows (to ensure some success).

b) To develop word attack skills that involve looking at individual letters (global students tend to be weaker in this), use exercises in which letters are deleted from words and need to be filled in by the student, e.g.: goal, _oal, g_al, go_l, goa_; toad, _oad, toa_, t_ad.

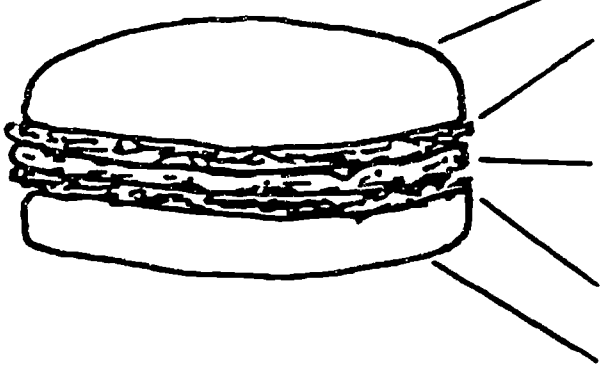
c) For the more global learners, spend twice as long on the introduction and overview to a topic. Present applications of the concept or skill. Have students come up with applications and uses. All this comes before they understand the details of the concept or task.

2. Analytic

a) Use a phonetic approach more often in language arts. Despite its successes, whole language is not <u>always</u> the best approach for every student at all ages.

3. Imaginal

a) The "hamburger" model for paragraph writing.



Top Bun - Introductory sentence

Lettuce, Tomato, Onion, etc.
Brings out the flavour, makes the paragraph clearer, and more interesting.

Meat. The main idea (the meat) of the paragraph perhaps with a little spice on it.

More lettuce, Tomato, Onion.
Bottom bun - Concluding sentence

b) When teaching place value, use different colours for units, tens, hundreds, thousands, etc. This is much easier now that colour printers are more available for computers. This also uses images that are more concrete than abstract.

c) When going from concrete to abstract, use an image to help make the transition, e.g., for grouping in multiplication, after the student is used to grouping coloured blocks, have the student practice grouping them mentally (image), before actually removing them.

d) Letters and sounds - see Charlie Brown's Alphabet, a computer game (dynamic visual and auditory images).

e) Use imaginal regulation of behaviour to learn and remember math computation skills, social skills and psychomotor learning; e.g., have the student visualize himself or herself taking three deep breaths then doing it, for anger control; make a mental picture of complete-but-simple long division question as a way of remembering the steps; remember the "feel" of weight on the downhill ski to avoid "head plants" on the ski hill.

4. **Verbal**

a) Use letters, acronyms and labels to help students remember information e.g., ROYGBIV (order of colour in rainbow), "Mary Very Easily Makes Jam Sandwiches Under No Pressure" (order of planets in our solar system).

b) Use verbal regulation of behavior to learn and remember math computation processes, social skills and psychomotor learning; e.g., Memorize "Three deep breaths and cool it" for anger control; "Estimate-Multiple-Subtract-Bring Down" for long division; "Weight on downhill ski" to avoid "head plants" on the ski hill.

5. **Concrete-Abstract**

a) When using concrete manipulatives, pay careful attention to those students who cannot abstract the concept or generalize it to other examples. Do these students also have difficulty with "learning by discovery"? Some of these students may be better off if they learn the concept in its abstract, but simple, form before they apply it to concrete examples.

6. **Composite examples**

a. Use an inflated balloon to teach interrelationships between pressure, volume and temperature using Imagery (concrete and abstract, visual and auditory), Global thinking, TEF and/or Reflective using a balloon. Students imagine they cover themselves with padding and are sucked into (sound effects are great here) the balloon using my "Magic De-magnification Machine". Then they imagine what happens as they bounce off each other inside the balloon just as gas molecules do. They also imagine the effects of heat, cold, change in balloon size and changes in the number of the students (gas molecules) in the balloon. This is great fun, especially when you pop the balloon at the end. (The script is available on request.)

b. Silly story; best used with groups of four (e.g. Sue, Sam, Albert and Dennis). Complete the following story.

_____ Sue _____ _____ to _____ Sam. But _____
(Adjective) (Verb) (Adverb) (Adjective) (Adjective)

Dennis _____ _____ to Albert. So the _____ four students
(Verb) (Adverb) (Adjective)

decided to _____ _____ to _____.
(Verb) (Adverb) (Noun)

The students will likely do this analytically and verbally if they are given no further instructions. So have them first come up with the overall idea of their story (Global) and illustrate it (Imaginal-Dynamic) before filling in the words.

Watch to see which students are stronger with the global and/or imaginal components and which are stronger with verbal, analytic. This is useful for identification. But remember, you are interested in the relative strengths within each student, not comparisons between students.

APPENDIX

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LEARNING STYLE IDENTIFICATION SCALE

Arthur J. More
University of British Columbia

This scale determines the stronger and weaker learning styles and learning strategies of a student. As you complete the scale, think of the student learning difficult concepts and skills. Think of the student learning in a variety of situations.

Student Name _____

When this student is learning a difficult concept, skill or task, he or she:

	almost always	usually	some times	seldom	almost never
1. learns best if the teacher does a good overview before working on the details.					
2. is only confused by examples of how to use the concept.					
3. finds out as much detail as possible before completing the task.					
4. attempts the task, expecting to learn from feedback about how (s)he did.					
5. does better when going from "examples" to "rules", than from "rules to examples".					
6. understands better when abstract concepts or principles are given.					
7. does better when pictures, diagrams or charts are used.					
8. does better when "hands on" activities are used.					
9. answers impulsively, but makes use of information on the correctness of his or her answer.					
10. does better if the concept or task is understood before dealing with specific concrete examples.					
11. does better by using mental images to help understanding.					
12. understands better by developing his or her own written explanation.					
13. does not need many examples to understand the concept or task, in fact the examples may even confuse.					

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	almost always	usually	some times	seldom	almost never
14. needs many examples to understand the concept.					
15. uses "wordy" explanations.					
16. learns much more effectively when the correctness or incorrectness of answers are explained.					
17. finds that names or labels for concepts are helpful for understanding and remembering.					
18. in reading, does better when phonics and specific word attack skills are used.					
19. does better when (s)he can draw pictures or diagrams to aid in understanding.					
20. in reading, does much better with "whole language" approaches than other approaches.					
21. finds "dictionary-style" definitions very helpful (provided the definitions are at the appropriate level).					
22. takes some time to think about answers before responding.					
23. does better when the concept is presented using concrete examples.					
24. does better when symbols or diagrams, rather than actual pictures, are used.					
25. does better when the teacher uses metaphors and similes (e.g. it is like ....).					
26. does better on learning relationships between concepts.					
27. does better when the task is broken down and the parts are learned in sequence.					
28. puts up his or her hand right away, even when unsure of the answer.					
29. reflects on each question to make sure of the answers.					
30. prefers to think it through and try to understand, rather than depend on teacher for correction.					
31. begins by breaking the task into smaller parts.					
32. does better if the concept is presented in a meaningful context.					

Scoring instructions on following page

LEARNING STYLE IDENTIFICATION SCALE

DIRECTIONS FOR SCORING

1. Go back to the questions. Score each response as follows:
   "almost always" = 5 "seldom" = 2
   "usually" = 4 "almost never" = 1
   "sometimes" = 3

2. Write the score for question 1 in the blank space for item 1 below. Do the same for question 2, and so on through the remaining questions.

3. Calculate the Total Global score by adding the Global scores. Write this score in the space provided. Calculate the remaining scores in the same manner.

4. Compare the Global and Analytic scores. A difference of more than 2 is meaningful. Similarly compare the Verbal and Imaginal scores, Concrete and Abstract scores, T/E/F and Reflective scores.

5. What are the stronger and weaker learning styles of this student? How do they compare with other students' learning style profiles? Are there relative strengths and weaknesses that will help you work more effectively with this student?

SCORING FORM

Style	Item	Score	Total	Style	Item	Score	Total
GLOBAL	1	_____		ANALYTIC	2	_____	
	20	_____			18	_____	
	26	_____			27	_____	
	32	_____	Total _____		31	_____	Total _____
VERBAL	12	_____		IMAGINAL	7	_____	
	15	_____			11	_____	
	17	_____			19	_____	
	21	_____	Total _____		25	_____	Total _____
CONCRETE	5	_____		ABSTRACT	6	_____	
	8	_____			10	_____	
	14	_____			13	_____	
	23	_____	Total _____		24	_____	Total _____
TRIAL/ ERROR/ FEEDBACK	4	_____		REFLECTIVE	3	_____	
	9	_____			22	_____	
	16	_____			29	_____	
	28	_____	Total _____		30	_____	Total _____

TEACHING STYLE IDENTIFICATION SCALE

Arthur J. More
University of British Columbia

This scale determines the teaching styles and strategies which you use. As you complete the scale, think of the ways you teach difficult concepts and skills. Think of the ways you teach over a variety of subjects, in a variety of situations.

NAME OF TEACHER _____

When I am teaching a difficult concept, skill or task, I:

	almost always	usually	some times	seldom	almost never
1. begin with a good overview before working on the details.					
2. avoid confusing the students with examples of how to use the concept or skill.					
3. ask students to think carefully about their answers before replying to questions in class.					
4. encourage students to try the task, and learn from their errors and feedback.					
5. give the "examples" first and then follow with the "rules".					
6. give first priority to understanding the abstract part of the learning task.					
7. use pictures, diagrams or charts.					
8. use more "hands on" activities.					
9. encourage students to make quick responses and then learn from information on the correctness of their answers.					
10. ensure that the concept is understood before dealing with specific concrete examples.					
11. encourage the students to use mental images to help them to understand better.					
12. have the students develop their own written explanations to help them understand better.					
13. give the "rules" first and then follow with the "examples".					

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	almost always	usually	some times	seldom	almost never
14. avoid the abstract, or leave it until the end.					
15. use lengthier or "wordy" explanations.					
16. emphasize explanation of the correctness or incorrectness of student answers.					
17. use names or labels for concepts to help the students to understand and remember.					
18. rely, in reading, on phonics and specific word attack skills.					
19. have the students draw pictures to aid in understanding.					
20. in reading, rely more on "whole language" approaches.					
21. find "dictionary-style" definitions are very helpful (provided definitions are at an appropriate level).					
22. encourage the students to take some time to think about answers before responding.					
23. emphasize my use of concrete examples.					
24. use symbols, rather than photographs or actual pictures.					
25. use metaphors and similes (e.g. it is like....).					
26. emphasize learning relationships between concepts.					
27. pay special attention to breaking down the task and presenting the parts in sequence.					
28. ask the student who puts up his or her hand first, even when (s)he seems unsure of the answer.					
29. encourage the students to reflect on each question before answering.					
30. encourage the students to think through and try to understand the concept rather than depend on me to correct them.					
31. begin by breaking the task into smaller parts.					
32. make sure I present the concept in a meaningful context.					

Scoring instructions on next page

TEACHING STYLE IDENTIFICATION SCALE

DIRECTIONS FOR SCORING

1. Go back to the questions. Score each response as follows:

"almost always"	= 5	"seldom"	= 2
"usually"	= 4	"almost never"	= 1
"sometimes"	= 3		

2. Write the score for question 1 in the blank space for item 1 below. Do the same for question 2, and so on through the remaining questions.

3. Calculate your Total Global score by adding the Global scores. Write this score in the space provided. Calculate your remaining scores in the same manner.

4. Compare your Global and Analytic scores. A difference of more than 2 is meaningful. Similarly compare your Verbal and Imaginal scores, Concrete and Abstract scores, T/E/F and Reflective scores.

5. You may also compare all eight scores to determine the teaching styles which you use most frequently , and least frequently.

6. Is your Teaching Style profile appropriate to your students? Is it appropriate to your own personality? Compare your profile with colleagues. Discuss the differences. How can this help you improve your teaching?

SCORING FORM

Style	Item	Score	Total	Style	Item	Score	Total
GLOBAL	1	_____		ANALYTIC	2	_____	
	20	_____			18	_____	
	26	_____			27	_____	
	32	_____	Total _____		31	_____	Total _____
VERBAL	12	_____		IMAGINAL	7	_____	
	15	_____			11	_____	
	17	_____			19	_____	
	21	_____	Total _____		25	_____	Total _____
CONCRETE	5	_____		ABSTRACT	6	_____	
	8	_____			10	_____	
	14	_____			13	_____	
	23	_____	Total _____		24	_____	Total _____
TRIAL/ ERROR/ FEEDBACK	4	_____		REFLECTIVE	3	_____	
	9	_____			22	_____	
	16	_____			29	_____	
	28	_____	Total _____		30	_____	Total _____

BEHAVIOURAL INDICATORS OF LEARNING STYLES

1a. **Global**: Tends to understand best when overall concept is presented first; Learns best when the overview or introduction is emphasized; Needs to learn in a meaningful context; Is more able to fill in missing words, parts of a story or explanation; Reading improves more from whole language, language experience, or sight words; Sees relationships easily; Functions are important to understanding.

b. **Analytic** (sequential): Tends to learn better when learning task is presented in small parts and gradually built up to the whole; Learns best when information must be presented in careful sequence; Context is less important; Reading improves more from a phonics approach.

2a. **Verbal**: Learns best from dictionary style definitions; Seldom explains using similes or metaphors; Learns labels easily; Remembers concepts better when labels are used; Uses verbal regulation of behavior more effectively; Codes information verbally rather than imaginally.

b. **Imaginal**: Learns best from images (concrete or abstract), symbols, or diagrams; Often explains difficult concepts using images or similes; Remembers better when an image, simile, or metaphor are used; Good at making up his/her own images but may have difficulty verbalizing them; Uses imaginal regulation of behavior; Codes information using imagery.

3a. **Concrete**: Learns best if examples are presented first, followed by concept or principle; Learns best with support from materials that can be seen touched or heard; Photographs rather than drawing are more helpful; "Hands on approach" is more effective; Needs more examples; May have difficulty separating the concept from the example; Concrete examples are better than abstract examples.

b. **Abstract**: Learns best if concept or principle is presented first, then examples; Picks up abstract concepts as readily as concrete concepts; Needs fewer examples (remember also that familiarity with, or relevance of, the concept will decrease the need for concrete examples); May even be confused by example.

4a. **Trial-Error-Feedback (TEF)**: Prefers to respond quickly (knowing the answer may not be completely correct), expecting to learn from (teacher's) feedback to the response; Responds more impulsively but relies on feedback; Responds quickly but makes more errors; Usually gives the first answer that comes to mind without thinking it through completely (More confident students tend to use this more frequently).

b. **Reflective** (Watch-then-do, Think-then-do, Listen-then-do): Learns better from thinking through (reflecting on) the answer very carefully and completely, than from trail-error-feedback; Takes time to respond; Thinks the answer through first; Has fewer errors because it is thought through or watched carefully; Depends less on external feedback; Often appears to be day dreaming but is actually reflecting.

5. Hearing, Seeing, Touching, Other: Other may include taste, smell, spatial/perceptual.

Summary of Systemic Observation Technique

This is a summary only. It is intended to be used as part of a professional developmental workshop on learning styles.

1. Commit Behavioural Indicators to memory; Ensure you understand them; List additional behaviors appropriate to your own students and courses.

2. Watch for these Behaviors among selected students; Plan questions, explanations, and assignments along the lines of these processes so you can observe students using them; Use "think aloud" technique to bring them out.

3. Take up to two minutes of each teaching hour to quickly record any observations on strengths and weaknesses and of frequencies in these behaviours. Don't spend more than two minutes per teaching hour, or you won't have time to keep this up. "Post it" notes are convenient here.

4. Continue taking these observations consistently and objectively for three weeks. Compile your results. This will take about three hours. The results will be a very useful accurate indication of learning styles of your students. (The notes you make are also very helpful for anecdotal reporting.)